

REMARKS/ARGUMENTS

Claims 1, 2, 5, 6, and 8-33 are pending in this application. Claims 1, 2, 5, 6, and 26 are amended by the foregoing amendments. Support for the amendments can be found in at least paragraphs [0047], [0057], and [0069] of the application as originally filed. No new matter has been added.

Claim Rejections – 35 U.S.C. § 103

Claims 1, 2, 5, 6 and 8-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,633,839 to Kushner et al. ("Kushner") in view of U.S. Patent No. 6,581,032 to Gao et al. ("Gao"). Applicants have amended claims 1, 2, 5, 6, and 26 to overcome this rejection.

Independent claim 1 teaches a subscriber unit comprising a feature extraction module configured to extract a plurality of features of a speech signal, the plurality of features being used for voice recognition, a voice activity detection module configured to detect voice activity within the speech signal, to divide the speech signal into speech frames and non-speech frames, wherein speech is detected in the speech frames and speech is not detected in the non-speech frames, and to provide an indication of detected voice activity, wherein the indication of detected voice activity comprises the speech frames without the non-speech frames, and a wireless transmitter coupled to the feature extraction module and the voice activity detection module and configured to transmit the indication of detected voice activity and the plurality of features over a wireless network to a voice recognition device in a distributed voice recognition system, wherein the indication of detected voice activity is transmitted at least one frame earlier than the plurality of features. Independent claims 2, 5, 6, and 26 recite similar but not identical features.

In the Response to Arguments section of the Office Action, the Office Action states that "applicants interpretation of speech based frame is not consistent with the specification description" and that the definition of "speech frame" in the specification includes "a feature representation of a speech signal" (Office Action, page 4). The Office Action cites page 9, lines 1-10; and page 11, line 30 - page 12, line 15 as supporting such a definition. Applicants respectfully disagree. Page 9, lines 1-10 teaches that one characteristic (i.e.,

feature) of a speech input that can be used to perform voice recognition of the speech input is the frequency characteristics of a speech frame of the speech input. However, the cited portion does not teach that the frame is itself a feature, but rather that the frequency characteristics of the frame is a feature. Page 11, line 30 - page 12, line 15 teaches that the feature extraction module extracts features from the speech signal and that the voice activity detection module separately determines which frames of the speech signal to transmit. Applicants respectfully submit that the cited portion does not teach or suggest that the frames themselves are features.

Applicants respectfully submit that neither Kushner nor Gao, alone or in combination, teach or suggest that the indication of detected voice activity comprises the speech frames without the non-speech frames, as taught by claim 1 as amended.

Kushner teaches a speech recognition system including a first communication device and a second communication device. The first communication device receives speech input, encodes data representative of the speech input, and transmits the encoded data to the second communication device. The encoded data includes spectral data and energy data. The second communication device compares the encoded data to a known data set and reconstructs the speech input from the spectral data and the energy data (Kushner, Abstract).

In the rejection of claim 1, the Office Action states that Kushner teaches a voice activity detection module for voice activity and refers to column 6, lines 34-59 of Kushner (Office Action, page 2). Applicants respectfully submit that while the cited portion of Kushner does teach generating indications of voice activity, none of the indications of voice activity described are speech frames without non-speech frames. The cited portion of Kushner teaches generating indications of voice activity that are sequences of two bits. The bit sequences indicate whether a frame is non-speech, voiced, unvoiced, or mixed-voiced (Kushner, column 6, lines 34-38). The generated bits are not speech frames without non-speech frames.

Further, Applicants respectfully submit that Kushner teaches generating and transmitting a variety of data about a speech signal, but does not teach that any of the transmitted data includes any frames of the speech signal, let alone speech frames without non-speech frames. For example, column 4, lines 5-20 of Kushner teaches a mobile phone

generating and transmitting data about a speech signal that includes the energy of the speech signal, the spectrum of the speech signal, the class of the speech signal, and pitch period data. All of the described data is generated by the mobile phone from the speech signal, but the generated data does not include any frames of the speech signal.

Moreover, Applicants respectfully submit that Kushner teaches away from an indication of detected voice activity comprising speech frames without non-speech frames. Kushner teaches in Figure 3 a method for recreating the speech input at the second computing device by processing the energy data and the spectral data received at the mobile device (Kushner, column 4, lines 20-30). If the features of Kushner included frames from the speech signal, there would be no need to recreate the speech signal from spectral data or energy data because the frames would have been included in the indication of detected voice activity that was transmitted to the second computer (e.g., voice recognition device). Kushner further teaches that "by using primarily the encoded speech signal generated by the mobile device 22 for the reconstruction of the speech input, the reconstructed speech is made available at the remote site 28 without significantly increasing the bandwidth of the transmission channel between the mobile device 22 and the fixed device 24" (Kushner, column 4, lines 36-42). Thus, Kushner clearly teaches away from an indication of detected voice activity including frames of the speech input because doing so would increase the bandwidth of the transmission.

Gao fails to cure the deficiencies of Kushner and similarly fails to teach or suggest an indication of detected voice activity comprises speech frames without non-speech frames, as claimed. Gao teaches a speech compression system that encodes a speech signal into a bit stream for subsequent decoding. The system optimizes the bandwidth consumed by the bit stream by balancing the desired average bit rate with the perceptual quality of the reconstructed speech. The speech compression system comprises a variety of codecs of increasing bit rates that may be activated based on aspects of the speech signal (Gao, Abstract).

Gao describes encoding a voice signal and transmitting the encoded voice signal along with an indicator of the bitrates used to encode portions of the bit stream. To the extent Gao teaches an indication of voice activity, it is the indicator of bitrates used to encode the voice signal and not frames of the speech signal. However, even if the encoded

voice signal of Gao could be considered an indicator of voice activity, it clearly includes all of the frames of the voice signal and not speech frames without non-speech frames, as taught by claim 1 as amended.

Because Kushner and Gao, alone or in combination, fail to teach or suggest each and every feature of claim 1, they cannot be used to render claim 1 obvious. Applicants therefore respectfully request that the Examiner withdraw the rejection and allow claim 1.

Independent claims 2, 5, 6, and 26 recite similar, but not identical, features as claim 1, and are therefore allowable for at least the reasons given above for claim 1. Applicants therefore respectfully request that the Examiner withdraw the rejections and allow claims 2, 5, 6, and 26.

Claims 8-25 and 27-33 are variously dependent on independent claims 1, 2, 5, and 26, and are therefore allowable for at least the reasons given above for claims 1, 2, 5, and 26. Applicants therefore respectfully request that the Examiner withdraw the rejections and allow claims 8-25 and 27-33.

CONCLUSION

In light of the amendments contained herein, Applicants submit that the application is in condition for allowance, for which early action is requested.

Please charge any fees or overpayments that may be due with this response to Deposit Account No. 17-0026.

Respectfully submitted,

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